



## AIRPOWER AS A SECOND FRONT

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**T**HROUGHOUT this century, nations have taken advantage of the speed, range, and flexibility of airpower to engage enemy forces on multiple fronts. Opening a second “air front” creates a synergistic effect with other operations, improving overall economy of force and increasing the probability of an outcome favorable to the United States and its allies. Of course, the concept of a second front is not new. Classic objectives in land warfare include dividing enemy forces, diverting enemy resources, spoiling advances on other fronts, and reestablishing the initiative. Airpower gives theater commanders a greater ability to realize these objectives. Unconstrained by geography, airpower can strike all of an enemy’s warfighting capabilities, almost simultaneously. An enemy determined to defend against attacks from the ver-

tical dimension must spread his resources across many points of attack, not just two or three. Airpower can also reduce an enemy’s capability and will to fight by directly striking his centers of gravity, even when opening a ground front is not feasible. Therefore, an air front can operate in conjunction with land and sea operations, or it can independently achieve a theater commander’s intent. Its full potential in joint theater warfare is not the sum of individual missions such as counterair, air interdiction, close air support (CAS), and strategic air attack; rather, it is the product of all air and space missions. The integrated application of airpower in a cohesive air front can be a great means—in terms of economy of force—of achieving theater objectives at a minimum cost in American lives and treasure.



*The air front played a decisive role in the defeat of Germany. Here, a formation of B-17 Flying Fortresses makes its way toward enemy targets in Europe.*

### **World War I: The First Battle of Britain**

The first use of airpower as a second front occurred during World War I. In 1915 Germany initiated a series of airship raids on London with the intent of creating terror, worker absenteeism, and public pressure on the British government to withdraw from the war. Although these attacks caused relatively little physical damage of military consequence, the psychological impact was significant, as was Great Britain's subsequent diversion of critical air resources from the war in France.

By the end of 1916, 12 of the Royal Flying Corps's 108 fighter squadrons were deployed at 30 airfields to defend against German airship attacks.<sup>1</sup> Since hydrogen-filled airships proved vulnerable to British interceptors and antiaircraft fire, Germany switched the weight of its effort to Gotha and Giant fixed-wing bombers, starting early in 1917. The first Gotha attack on London on 13 June 1917 killed 162 people and wounded 432.<sup>2</sup> As a result of this single raid, factory absenteeism soared, productivity fell, and outraged citizens demanded protection from future attacks. To meet this threat, the British War Cabinet approved an in-

crease in the Royal Flying Corps to 200 squadrons and recalled two additional fighter squadrons from France, despite the precarious air situation over the front.<sup>3</sup> Field Marshal Sir Douglas Haig, commander in chief of British forces in France, telegraphed the cabinet that the "withdrawal of these two squadrons will certainly delay favorable decision in the air and render our victory more difficult and certainly more costly."<sup>4</sup>

Although German air attacks fell short of their ultimate objective, they demonstrated the potential of opening an air front directly over an enemy's homeland. The bombing campaign made a lasting impression on the British and is cited frequently as a primary reason for the establishment of the world's first independent air service—the Royal Air Force (RAF). The "first battle of Britain" also helped plant the seeds for a strategic bombing doctrine that would culminate in the opening of another air front 24 years later in the skies over Germany.

### **World War II: Airpower as a Second Front in Europe**

Less than a month after Germany invaded the Soviet Union in 1941, Joseph Stalin informed Winston

Churchill that “the military position of the Soviet Union, as well as that of Great Britain, would be significantly improved if the Allies opened fronts against Hitler in the West and in the North.”<sup>5</sup> Unable to open a second ground front in Europe in 1942, the United States and Britain initiated a heavy bomber offensive—an air front—against Axis combat forces, military installations, and military industries. Following the Casablanca Conference on 21 January 1943, President Franklin D. Roosevelt and Prime Minister Churchill announced the objectives of their Combined Bomber Offensive in Europe as “the progressive destruction and dislocation of the German military, industrial and economic system, and the undermining of the morale of the German people to a point where their capacity for armed resistance is fatally weakened.”<sup>6</sup>

The air front played a decisive role in the defeat of Germany. Allied air attacks forced Germany to dedicate vast amounts of manpower and resources to continental air defense, reducing the Germans’ ability to fully support land operations. By 1944 over 800,000 Germans were committed to air defense, including the crews of about 54,000 antiaircraft guns;<sup>7</sup> furthermore, a million Germans were engaged in repairing damage caused by air strikes.<sup>8</sup> In fact, Germany dedicated more forces to air defense than it deployed to counter the Allied campaign in Italy.

The air war also caused a significant shift in Germany’s resource priorities. In 1944 *more than half* of Germany’s industrial base was working to satisfy the Luftwaffe’s needs. Albert Speer, architect of the German war economy, estimated that 30 percent of artillery, 20 percent of heavy ammunition, and over 50 percent of electronics production were dedicated to air defense, depriving frontline ground forces of critical antitank munitions and communications equipment.<sup>9</sup> Production of antitank guns was halved in favor of building more antiaircraft guns.

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The bombing campaign also forced German aircraft manufacturers to focus almost exclusively on producing fighters. At the beginning of the war, the

Luftwaffe operated about the same number of bombers and fighters. By 1945 the mix had shifted to more than 26,000 fighters and fewer than 3,000 operational bombers.<sup>10</sup> A frustrated Speer later indicated that the air defense effort was wasteful, since it forced the Germans to spread resources across their country, while the Allies could concentrate their attacks when and where they chose to overwhelm German defenses. If Germany had been able to apply these resources to reinforce its coastal defenses in France or to build thousands of tanks that could have been used during the Battle of the Bulge, the cost in terms of American lives alone would have been tremendous.

### **World War II: Airpower as a Second Front in the Pacific**

In the Pacific, the air front was a primary reason for Japan’s capitulating without the need for a costly invasion of the home islands. According to Maj Gen Haywood S. Hansell, a key architect of the Pacific air war strategy, our objectives closely mirrored those established for the European bombing campaign: “to defeat the enemy air force and so weaken the Japanese capability and will to fight as to cause capitulation or permit occupation against disorganized resistance; failing this, to make an invasion feasible at minimum cost.”<sup>11</sup> Japan was uniquely vulnerable to air attacks. The home islands were absolutely dependent on extended supply lines for the raw materials that Japan needed to maintain its economy and to fuel its war industries. Troops deployed to outer perimeter islands were dependent on shipping for resupply and could not easily concentrate to counter Allied assaults. Geography also made it difficult for the Japanese to mass their air forces rapidly.

The Allied strategy for the Pacific focused on two complementary air-land-sea thrusts that would cut Japanese supply lines and bring American air forces within range of the home islands. Adm Chester W. Nimitz commanded the Central Pacific campaign, which moved through the Marshalls, the Marianas, Iwo Jima, and Okinawa, while the Southwest Pacific campaign under Gen Douglas MacArthur progressed across the northern coast of New Guinea and up through the Philippines. The US long-range bombing campaign against Japan began early in 1943 when the decision was made to base B-29s in China to attack targets in Manchuria

and Kyushu. At the time, no other bases were available that would put B-29s in range of Japanese “inner zone” industries. President Roosevelt also believed that B-29 strikes on Japan from bases in China would have a tremendous impact on the morale of our Chinese allies.<sup>12</sup> From their inception, B-29 operations in China were limited by logistics, since nearly everything needed to generate a sortie required air transport from Allied bases in India. Due to low sortie rates and the upcoming availability of Pacific bases in range of Japan, the US Army Air Forces discontinued strikes out of China in favor of consolidating B-29 operations under XXI Bomber Command in the Pacific. Staging out of Saipan, XXI Bomber Command flew its first B-29 strike against Japan on 24 November 1944.

From November 1944 until the end of the war, B-29s stationed on Saipan, Guam, and Tinian dropped over 146,000 tons of munitions on home island targets.<sup>13</sup> According to the postwar *United States Strategic Bombing Surveys* (USSBS), air attacks on the Japanese home islands destroyed 470,000 barrels of petroleum products, 221,000 tons of foodstuffs, and 2 billion yards of textiles. Damage to Japan’s industries caused by bombing and the subsequent dispersal of manufacturing facilities reduced oil production capacity by 83 percent, aircraft engine production by 75 percent, airframe production by 60 percent, and army/navy ordnance production by about 30 percent. For the last month of the war, electric power and coal consumption were about half of the peak volume recorded in 1944. Production hours lost due to absenteeism, worker illness, air-raid alerts, and “enforced idleness” increased to 40 percent by July 1945.<sup>14</sup> The USSBS also credits mines, most of which were dropped by B-29s, for sinking over 800,000 tons of Japanese shipping during the war. During June and July 1945, about half of the ships lost in Japan’s harbors and waterways struck mines dropped by B-29s.<sup>15</sup>

The USSBS also determined that the psychological impact of the air attacks on the Japanese population was significant. According to postwar surveys, by June 1944 only 2 percent of the Japanese population felt that defeat was inevitable. One year later, this had increased to 46 percent; just before Japan surrendered, 68 percent of the population believed the war was lost. The USSBS indicates that over half of the Japanese who accepted defeat before the surrender cited air attacks as the principal cause.<sup>16</sup> Adm Asami Nayano, chief of the naval staff and supreme naval advisor to

the emperor, concluded, “If I were to give you one factor as the leading one that led to your victory, I would give you the [US] Air Force.” Prince Fumimaro Konoye, premier of Japan, concurred, declaring, “The determination to make peace was the prolonged bombing by the B-29s.”<sup>17</sup>

The Allied invasion of the home islands would have resulted in hundreds of thousands of Allied casualties. Although casualty estimates vary, noted historian Peter Maslowski cites a Joint War Plans Committee document of 15 June 1945 titled “Details of the Campaign against Japan” as one of the more authoritative sources: 40,000 Allied dead, 150,000 wounded, and 3,500 missing in action for the invasion of Kyushu and landings on the Tokyo plain.<sup>18</sup> Hundreds of thousands of Japanese soldiers and civilians also would have been killed or wounded. The invasion of Japan, had it taken place, would have been one of the bloodiest battles in the history of human conflict. Clearly, the air front in the Pacific, as in Europe, proved its value as an economical means of helping to win a decisive victory and save American lives.

### Korean Conflict

On 25 June 1950, North Korean forces—consisting of seven infantry divisions, a tank brigade, and support units—attacked South Korea. American forces were not prepared for the onslaught; in fact, not a single US combat troop was stationed in South Korea at the time of attack. While our ground forces prepared to deploy to Korea, forward-deployed US Air Force fighters opened the air front by flying protective cover for retreating South Korean forces on the second day of the war. By day three, Air Force fighters were flying the first CAS sorties, followed by the first interdiction missions on 28 June. Nine days into the conflict, the first Navy combat sorties of the war were flown by fighters staging off the carrier *Valley Forge*.<sup>19</sup>

From the opening stages of the Korean conflict until the Inchon landing on 15 September 1950, Allied air attacks on enemy lines of communications, support infrastructure, and combat forces effectively disrupted the North Korean offensive. By early September 1950, low morale was pervasive among communist forces operating in South Korea; surveys of former prisoners of war (POW) indicate that the shortage of food and fear of air attacks were the principal causes.<sup>20</sup> Between 25 June and 15 July 1950, an average division in the North Korean People’s Army (NKPA) received 18 tons



*Bombed, rocketed, and strafed by Far East Air Forces fighters and bombers, a locomotive lies destroyed in North Korea's Wonsan Railroad Locomotive Works yard. Bombing attacks and follow-up missions put this vital rail repair center out of operation.*

of food, 12 tons of petroleum products, and 166 tons of ordnance. Air attacks had reduced this to 2.5 tons of food, 2 tons of petroleum products, and 17 tons of ordnance from 16 August to 20 September 1950—a reduction of 89 percent.<sup>21</sup>

Allied air forces proved essential to defeating communist surges as friendly forces withdrew and then held at the Pusan perimeter. During the critical period of 27 June through the end of September, Air Force fighters and bombers flew a total of 27,651 combat sorties, mostly from bases in Japan.<sup>22</sup> Even B-29s were occasionally tasked to fly CAS sorties to spoil North Korean attacks. Although friendly losses on the ground were significant, they would have been far greater and the outcome questionable had it not been for airpower. The people who were there had little reason to doubt that the air front had been critical to the defense of the Pusan perimeter. In fact, Gen Walton H. Walker, commander of the US Eighth Army, later concluded, “If it had not been for the air support that we received from the Fifth Air Force we would not have been able to stay in Korea.”<sup>23</sup>

### **Vietnam Conflict**

Our third major conflict in the Pacific theater in 25 years also demonstrated the potential of an air front to

compel change in an enemy's policy. In the fall of 1972, our main strategic objectives for the Vietnam conflict were to achieve a cease-fire, extract American forces, and complete the process of enabling South Vietnam to defend itself. In late October 1972, North Vietnam withdrew from peace negotiations after South Vietnam's president Nguyen Van Thieu objected to a proposal for a cease-fire and subsequent American withdrawal that would have left communist forces in place in South Vietnam. Rumors that Congress intended to discontinue funding for the war in January 1973 may have contributed to North Vietnam's decision to withdraw from the talks. President Richard M. Nixon was faced with a dilemma: how to bring the North Vietnamese back to the table and reach an accord before Congress terminated funding for operations in South Vietnam.

After a month of negotiations failed to restart the talks, President Nixon ordered an all-out, concentrated air campaign against key targets in North Vietnam. Linebacker II commenced on 18 December 1972 with the intent of forcing North Vietnam's leadership to return to the peace talks. Over the 11 days of the campaign, B-52s flew 729 sorties and delivered more than 15,000 tons of bombs on 34 strategic targets in North Vietnam.<sup>24</sup> The effect was devastating. Electric power

in the Hanoi region was cut by 75 percent; available fuel supplies decreased by 25 percent; and rail traffic through Hanoi was effectively disrupted. Without its rail system, North Vietnam could not provide a steady flow of materiel to its troops, who were still recovering from their summer offensive. In fact, North Vietnamese general Tran Van Tra reported that his forces in the south—already short of food, clothing, and ammunition before the bombing began—were incapable of continuing hostilities.<sup>25</sup> In addition, Linebacker II exhausted North Vietnam's supply of surface-to-air missiles, leaving the North Vietnamese nearly defenseless against future attacks.

At the end of the "11-day war," President Nixon had achieved his goal: the North had returned to the peace talks. At the same time, the bombing campaign disrupted the North Vietnamese army's lifeline to the North, threatening its effectiveness and perhaps even its continued existence in South Vietnam as a cohesive force. Although airpower cannot take full credit for the subsequent peace agreement, it certainly played a primary role by compelling North Vietnam's leadership to drop its intransigence and to negotiate in earnest. President Nixon believed that Linebacker II was the reason the North Vietnamese returned to the negotiations. As he later stated in his memoirs, "The bombing had done its job; it had been successful."<sup>26</sup>

### **Operations Desert Shield/Desert Storm**

The stunning success of the Desert Storm air front demonstrated the value of the sequential and integrated use of airpower by a theater commander. The result of the 39-day air campaign was a 100-hour ground operation that liberated Kuwait with relatively few friendly casualties. Following the Iraqi invasion of Kuwait in August 1990, President George W. Bush declared that US objectives included the "immediate, complete, and unconditional withdrawal of all Iraqi forces from Kuwait; restoration of Kuwait's legitimate government; security and stability of Saudi Arabia and the Persian Gulf; [and] safety and protection of the lives of American citizens abroad."<sup>27</sup> As in Korea 40 years earlier, airpower was the first to deploy to defend a friend. Within 38 hours of receiving the order to deploy, Air Force F-15s were in Saudi Arabia, ready for combat. As US and allied forces continued to arrive in-theater over the next five months, air planners led by Brig Gen Buster Glosson devised a comprehensive campaign to

isolate and incapacitate the Iraqi command structure; win air superiority; destroy the enemy's nuclear, biological, and chemical capability; eliminate Iraq's offensive capability; and eject the Iraqi army from Kuwait.<sup>28</sup>

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On 17 January 1991, Gen Charles A. ("Chuck") Horner, the joint force air component commander (JFACC), executed the first air strikes against Iraqi targets in Iraq and the Kuwaiti theater of operations (KTO). Campaign planners fully exploited the capabilities of a modern air force, including the F-117's ability to penetrate the toughest air defenses, the range and large payloads of B-52s, and the force-multiplying effect of precision munitions. Coalition attacks were focused on Iraqi centers of gravity, including command, control, and communications infrastructure; key military production facilities; transportation infrastructure; and fielded forces. The overall intent was to destroy Saddam's capability to wage war while minimizing coalition losses, Iraqi civilian casualties, and collateral damage.

Results were nothing short of spectacular. Air superiority was achieved in seven days; by 27 January 1991, Gen H. Norman Schwarzkopf, commander in chief of US Central Command (USCENTCOM), declared that coalition air forces had established air supremacy, clearing the way for subsequent air and surface operations.<sup>29</sup> Air attacks effectively neutralized Saddam's intelligence-gathering apparatus, preventing him from detecting coalition forces massing on the Iraqi border for the eventual "left-hook" ground assault. Airpower destroyed key strategic targets throughout Kuwait and Iraq, hindering Saddam's capability to effectively command and sustain his forces. Coalition air strikes also severely damaged Iraq's military production capacity; by the end of the war, "at least 30 percent of Iraq's conventional weapons production capability . . . was damaged or destroyed."<sup>30</sup>

The success of the air campaign was one of the primary reasons for the rapid liberation of Kuwait and the subsequent capture of a large number of Iraq's offensive weapons. Before the ground war began on 24

February 1991, coalition airpower had attrited Iraqi forces to such an extent that they were unable to conduct a successful defense of Kuwait, much less wage Saddam's "mother of all battles."<sup>31</sup> According to a postwar survey of the KTO by the Central Intelligence Agency (CIA), about 43 percent of the tanks and 32 percent of the armored personnel carriers in Saddam's heavy divisions failed to move to engage friendly forces or flee during the ground war, indicating that they were out of commission due to air strikes and/or poor maintenance or that they were simply abandoned by their crews.<sup>32</sup> Col Viktor Patzalyuk, former Soviet attaché in Baghdad, later stated, "I had first-hand information from the front: out of 2,400 MBTs [main battle tanks], 1,865 were destroyed by Coalition air power. This does not include Iraqi tanks destroyed by U.S. Army aviation."<sup>33</sup> By G day, airpower had so demoralized Iraqi troops remaining in the KTO that many coalition units experienced only token resistance. This demoralization was especially evident in Iraqi frontline infantry divisions.

After studying Iraqi POW reports, Dr Stephen Hosmer, an analyst for the Rand Corporation, wrote that "the Coalition air campaign subverted the Iraqi soldiers' will to fight."<sup>34</sup> POW reports indicate that an average of 50 percent of Iraq's frontline infantry troops that had deployed to the KTO deserted prior to G day.<sup>35</sup> A total of 86,000 Iraqi soldiers eventually surrendered to the coalition; many more fled for home or refused to return from leave before the ground war began.<sup>36</sup> As the Air Force's *Gulf War Air Power Survey* of 1993 concluded, numerous Iraqi POWs pointed to airpower as the reason for their defeat: "Soldiers recognized they were helpless. Their equipment steadily disappeared in explosions and smoke; trucks on which resupply depended disappeared fastest of all; but as day-to-day living conditions deteriorated, all feared that aircraft attacking their comrades would soon come after them."<sup>37</sup>

The air front was also a primary reason for the low number of casualties sustained by coalition forces during the ground war, a result that contradicted prewar forecasts. During Desert Shield, USCENTCOM's surgeon general planned for a coalition casualty rate of 9 percent, equating to approximately 21,474 soldiers wounded or killed.<sup>38</sup> In June 1991, General Schwarzkopf stated that before Desert Storm began, he had estimated US casualties as great as 20,000

troops, about one-third of whom would be killed.<sup>39</sup> Actual losses during the 100-hour ground operation were far less than originally anticipated. A total of 147 US servicemen and women were killed in action during Desert Storm, including 28 fatalities from the Scud strike on the US barracks in Dhahran, Saudi Arabia, on 25 February.<sup>40</sup> Twenty-nine airmen died as a result of hostile actions during the air campaign. US ground forces suffered no casualties as the result of attacks by enemy fixed-wing air forces.<sup>41</sup>

In retrospect, the Iraqi forces that were attrited prior to the ground campaign, the incredible number of soldiers who surrendered or deserted their posts, the demoralized state of the troops who remained, the rapid liberation of Kuwait, and the low number of US casualties all point to the value of using a mature air instrument to achieve the maximum economy of force. However, the term second front does not adequately describe the Desert Storm air campaign. In the past, opening an air front was often the only means of engaging an enemy before a ground invasion, as in Europe during World War II, or as a act of desperation to help stop an invading force, as in Korea. Neither condition applied to Desert Storm, where airpower was used more as a primary rather than a secondary front. General Schwarzkopf could have initiated Desert Storm with a classic combined-arms offensive. Instead, he chose to use an air front to accomplish a specific set of objectives *prior* to engaging in ground combat.

In effect, the Desert Storm air campaign was followed by a masterfully executed 100-hour ground operation that drove a greatly diminished and demoralized enemy out of Kuwait. Desert Storm vindicated the belief of many airmen that the integrated application of airpower, centrally controlled by an airman, could be a decisive instrument of national policy. Throughout this century, airpower theorists have advocated the decisive potential of airpower. Many of their predictions for earlier conflicts proved premature. But the development of stealth aircraft, information technologies, precision munitions, and a strategy that focused on simultaneous air attacks on all of an enemy's centers of gravity gave General Schwarzkopf an instrument that was ideally suited to achieving his strategic objectives. Air and space power came of age in the Gulf, and the "air option" has assumed a new meaning for our war-fighting CINCs. In the words of Air Vice-Marshal R. A. Mason of the RAF, "The Gulf

War marked the apotheosis of twentieth-century air power.”<sup>42</sup>

### Towards the Future

From World War II to Desert Storm, Americans have used airpower in second fronts to split enemy defenses, to decrease the enemy's ability and will to resist, and to save lives. Air fronts have been an effective means of setting the pace for other operations and striking directly at enemy centers of gravity, even when conditions precluded all other options. Despite the evidence of history, airpower's accomplishments and potential remain a hotly debated topic. Facts, filtered through layers of service doctrine and training, can lead to widely different conclusions. For example, the authors of *Certain Victory*, an official US Army history of the Gulf War, wrote, “Indeed, in an age of unprecedented technological advances, land combat is now, more than ever, the strategic core of joint war fighting. . . . Desert Storm again demonstrated that determined enemies can only be defeated with certainty by decisive ground action. . . . *Maintaining an immediately deployable capability for decisive land combat to end a conventional conflict successfully is the single most enduring imperative of the Gulf War*” (emphasis in original).<sup>43</sup>

What are the “imperatives” for future conflicts? Historical evidence shows that airpower can be an effective means of vertically enveloping the enemy to establish the conditions for victory. In Desert Storm, the entire world saw the results of a mature air force applied in a cohesive campaign. In future conflicts, all service components—land, sea, and air—have the potential to be decisive, depending on the nature of the conflict, operating environment, and strategic objectives. Theories of joint warfare that postulate otherwise are actually antitheses of jointness. The key to achieving joint synergy is understanding the potential of each service component and assigning missions to maximize their contributions. Future campaign planners should carefully consider airpower's capability to establish the timing and tempo of follow-on operations and the option of using airpower in a *primary* front to achieve theater objectives directly, supported by land and sea operations.

*The real imperative in war is to win a decisive victory while incurring the fewest possible friendly casualties.* Blindly adhering to rigid, formulaic doctrines

that fail to take full advantage of all the tools at a CINC's disposal may result in an outcome that is very costly—perhaps prohibitively so.

### Notes

1. Maj Raymond H. Fredette, *The Sky on Fire* (New York: Holt, Rinehart and Winston, 1966), 63.
2. Ibid., 62.
3. Ibid., 66.
4. Henry A. Jones, *The War in the Air*, vol. 5 (Oxford: Clarendon Press, 1935), 39.
5. Louis Fischer, *The Road to Yalta* (New York: Harper & Row, 1972), 14.
6. Russell F. Weigley, *The American Way of War* (New York: Macmillan Publishing, 1973), 338.
7. Roger Beaumont, “The Bomber Offensive as a Second Front,” *Journal of Contemporary History* 22 (January 1987): 15.
8. Richard G. Davis, Carl A. Spaatz and the Air War in Europe (Washington, D.C.: Government Printing Office, 1993), 590.
9. Ibid.
10. Beaumont, 15.
11. Haywood S. Hansell, Jr., *The Strategic Air War against Germany and Japan* (Washington, D.C.: Office of Air Force History, 1986), 141. Major General Hansell was the first commander of XXI Bomber Command.
12. Ibid., 142.
13. *The United States Strategic Bombing Surveys (European War) (Pacific War)* (30 September 1945, 1 July 1946; reprint, Maxwell AFB, Ala.: Air University Press, October 1987), 84. Another 800 tons were dropped by China-based B-29s between June 1944 and January 1945. Overall, B-29s delivered more than 91 percent of the total tonnage dropped on the home islands during World War II. The Navy dropped 6,800 tons (4.2 percent), and Army aircraft other than B-29s delivered an additional 7,000 tons (4.3 percent).
14. Ibid., 87–89.
15. Ibid., 73.
16. Ibid., 95.
17. Hansell, 257.
18. Peter Maslowski, “Truman, the Bomb, and the Numbers Game,” *Military History Quarterly*, Spring 1995, 104.
19. The first Navy combat sorties were flown on 3 July. Two days later, the *Valley Forge* withdrew for 13 days of replenishment. USAF Assistant Chief of Staff for Studies and Analysis, *A Quantitative Comparison between Land-based and Carrier-based Air during the Early Days of the Korean War* (Washington, D.C.: Headquarters USAF, June 1972), 7.
20. Eduard Mark, *Aerial Interdiction* (Washington, D.C.: Government Printing Office, 1994), 282.
21. Ibid., 281.
22. *United States Air Force Statistical Digest for Fis-*



cal Year 1953 (Washington, D.C.: Headquarters United States Air Force, 1953), 20, table 9. The Air Force flew 76 percent of the total US combat sorties during this period. The Navy flew 7,741 sorties (21 percent), and the Marine Corps flew 1,037 sorties (3 percent).

23. Robert Frank Futrell, *The United States Air Force In Korea, 1950–1953* (Washington, D.C.: Office of Air Force History, 1983), 146.

24. Mark Clodfelter, *The Limits of Airpower* (New York: Free Press, 1989), 194.

25. Gabriel Kolko, *Anatomy of a War: Vietnam, the United States, and the Modern Historical Experience* (New York: Pantheon Books, 1985), 444–45. Gen Tran Van Tra commanded all communist forces in South Vietnam.

26. Richard Nixon, RN: *The Memoirs of Richard Nixon* (New York: Grosset and Dunlap, 1978), 748.

27. *Conduct of the Persian Gulf War: Final Report to Congress* (Washington, D.C.: Department of Defense, April 1992), 30. (Unclassified edition)

28. Briefing, Lt Col Allan Howey, subject: The Air Campaign from Close to the Mirror, Washington, D.C., Headquarters USAF, Doctrine Division, 1992, 8. Lieutenant Colonel Howey was a member of Col John Warden's Checkmate team, which developed the initial air plan known as Instant Thunder, which evolved into the Desert Storm air campaign plan.

29. *Conduct of the Persian Gulf War*, 127. (Unclassified edition)

30. Ibid., 159.

31. Based on a recent assessment by the United States Air Force National Air Intelligence Center, captured senior Iraqi commanders acknowledged that, because of the damage inflicted by the air campaign, they could not mount a successful defense of Kuwait.

32. Hank Malcolm, "Operation Desert Storm: A Snapshot of the Battlefield," research paper (Langley, Va.: Central Intelligence Agency, Directorate of Intelligence, 1993).

33. "Gulf War Highlighted Coalition Censoring," *Jane's Defence Weekly*, 19 February 1994, 24.

34. Stephen T. Hosmer, *Effects of the Coalition Air Campaign against Iraqi Ground Forces in the Gulf War*,

Rand Report no. MR-305-AF (Santa Monica, Calif.: Rand Corporation, 1994), 137.

35. Ibid., 103, 116.

36. *Conduct of the Persian Gulf War*, 578. (Unclassified edition) In an effort to preserve the health and morale of his forces in the KTO, Saddam maintained a liberal leave policy until he ordered his forces to withdraw.

37. *Gulf War Air Power Survey*, vol. 2, part 1 (Washington, D.C.: Office of the Secretary of the Air Force, 1993), 325. (Unclassified edition)

38. These figures are from a prewar analysis of potential casualties in Desert Storm by the surgeon general of US Central Command. USCENTCOM Adjutant General's files, Headquarters USCENTCOM, MacDill AFB, Fla.

39. Molly Moore, "Schwarzkopf: War Intelligence Flawed," *The Washington Post*, 13 June 1991, A40.

40. Robert L. Goldrich and John C. Schaefer, *CRS Report for Congress: U.S. Military Operations, 1965–1994, Data on Casualties, Decorations, and Personnel Involved* (Washington, D.C.: Congressional Research Service, 27 June 1994), 36. The figure of 147 killed in action includes 35 casualties from friendly fire. There were an additional 152 nonhostile US fatalities during Desert Storm.

41. Of the 29 airmen killed as a result of enemy action, 20 were from the Air Force, three were from the Marine Corps, and six were from the Navy. Statistics on Air Force casualties were obtained from the Air Force Military Personnel Center/DPMCAC; Marine Corps casualties from the USMC Casualty Section; and Navy casualties from the USN Casualty Branch. The last US casualty caused by enemy fixed-wing air occurred in April 1953, during the Korean War.

42. R. A. Mason, "The Air War in the Gulf," *Survival*, May-June 1991, 225.

43. Brig Gen Robert H. Scales, Jr., *Certain Victory: The U.S. Army in the Gulf War* (Washington, D.C.: Office of the Chief of Staff of the United States Army, 1993), 358–60. General Scales was the director of the Army's Desert Storm special study group that wrote *Certain Victory*.

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